NDBW1401 SW Specification

MODEL :NDBW1401

DATE : 2015/04/29

REVISION : 1.0

Issued by : Dayong_Wu

Check by :

Project leader by :

Revision History

Version	Date	Revision Change	Editor
1.0	2015/01/16	First Release	Dayong_Wu

1. Preface

The software engineering specification is a deployment from product marketing specification. It should outline major tasks to be implemented in a specific model. For any model which has been defined from product marketing division, there should have a product marketing specification comes out.

The purpose of this specification is to be an implementation guideline for engineers who are responsible for the model. It intends to avoid ambiguity about function definitions so as to allow engineers to shorten their implementation period.

The specification covers all the bundled software components which including BIOS, Micro-Controller, device drivers and applications. The target Operating Systems will be Windows 8.x 64 bit and Win10. The device drivers and applications are options based on per-customer's requirements.

The readers of this specification are assumed to have enough experiences and knowledge to understand whatever in the context. The specification will not intend to explain any detail of specific topic.

2. Product Related Spec

清华同方
TSINGHUA TONGFANG

Product Specification

Revision	1.1	Project	NDBW1401
Motherboard	Processor	CPU	Intel Braswell
		Support SoC type processors	*14nm, type 3 BGA package 25mmx27mm *USB3.0*4 ports+USB2.0*1 port *PCI-E2.0 *4 ports *SATA 3.0*2 ports *eDP1.4 /HDMI1.4b *DX11.1, Intel HD graphics
		Processor-N3700	N-3700 Quad core, 2.4GHz, SDP 4W, TDP 6W Support DDR3L 1600MHz, GFx frequency up to 700MHz
		Processor-N3150	N-31500 Quad core, 2.08GHz, SDP 4W, TDP 6W Support DDR3L 1600MHz, GFx frequency up to 640MHz
		Processor-N3050	N-3050 Dual core, 2.16GHz, SDP 4W, TDP 6W Support DDR3L 1600MHz, GFx frequency up to 600MHz
		Processor-N3000	N-3000 Dual core, 2.08GHz, SDP 3W, TDP 4W Support DDR3L 1600MHz, GFx frequency up to 600MHz
		Socket type & number	One memory socket
		Max memory support	System DDR3L up to 8GB total
Memory		Specification	DDR3L 1600 MHz
		Socket type & number	One memory socket
		Max memory support	System DDR3L up to 8GB total
BIOS		KBC ITE8928E/BX	*ACPI 3.0 compliant *Non Sharing System BIOS ROM for KB & EC Codes
		AMI BIOS	*Supports PnP, ACPI 5.0 *Support external USB flash memory card boot up *Be with 8MB flash ROM for Windows 8.1

Display	**Panel type**	**14" HD, 16:9 LED type**
	Panel thickness	**3.xmm (Edp/LVDS)**
	Backlight	**LED**
	Resolution	**1366x 768**
Audio	**Codec Realtek ALC269Q**	***Azalia standard support *D3 mode support**
	Speaker/MIC	***Build-in two speakers, one speaker as option *Speaker : 1.5W *Internal Microphone support**
Keyboard	**CHICONY**	***US/UK/BR 88 Keys inside KB support *300.8mm x 109.2mm x 3.6±0.2mm**
Pointing Device	**Synaptics/Sentelic**	***PS2 Touch Pad with 2 buttons 92X52mm *Hidden type solution (under plastics)**
Storage	**HDD**	***2.5" SATA HDD support *7mm *5400rpm**
	Card reader	**Support SD only SDIO interface SD support as below (1) Default Speed mode: 3.3V signaling, Frequency up to 25 MHz, up to 12.5 MB/sec (2) High Speed mode: 3.3V signaling, Frequency up to 50 MHz, up to 25 MB/sec (3) SDR12: 1.8V signaling, Frequency up to 25 MHz, up to 12.5MB/sec (4) SDR25:1.8V signaling, Frequency up to 50 MHz, up to 25MB/sec (5) DDR50: UHS-I 1.8V signaling, Frequency up to 50 MHz, sampled on both clock edges, up to 50MB/sec**
ODD support	**Follow KPL**	**9.5mm SATA ODD support**
Webcam	**Follow KPL**	***USB interface *Build in Camera module support *HD/VGA webcam for Win8.1 support**
AC Adapter	**Follow KPL**	**Automatics Voltage adjustment between 100 and 240VAC 50/60Hz, 40 Watts (19V/2.1A), 2 Pin wall mount type**
Battery	**Follow KPL**	***Li-ion Battery, 18650, SW Gas Gauge IC, soft pack, non-removable *2 cells, 7.4V/2200mAh (2s1p) *3 cells, 11.1V/2200mAh (3s1p)**
	Battery life	**Battery Life without TV (Mobilemark2012) 2-cell: TBD 3-cell: TBD**
Wireless	**LAN Controller RTL8111G**	***Supports 10/100/1000 Mb/Sec. *PCI-E interface *Support S3/S4/S5 wake on LAN (WOL) feature**
	WLAN RL-UM12BS-8188ETV-V1.0 RL-UM02WBS-8723BU	***LGA type w/USB interface, *IEEE802.11b/g/n support\ *WIFI only(8188ETV) *Combo Module(RTL8723BU)**

LED Indicator	**Power & Battery**	***Power On: White** ***Suspend: Blinking White** ***Charging: Purple @power-on, orange @power-off** ***Battery Low (<6%): interlaced Blinking White & Purple**
OS Support	**OS version**	**Supports Windows 8.1 64bit** **Supports Windows 10(TBD)**
Certification	**EMI**	**CE**
	SAFETY	**CB**
	ROHS	**RoHS Compliance**
System Specification	**Physical Outline**	**342 X 240 X 24.2 mm** **(Battery Bump out 29.9 mm)**
	USB port	**1 x USB 3.0 + 2 x USB 2.0 ports**
	HDMI port	**X 1**
	Card reader	**X 1 (SD only)**
	RJ45 port	**X 1**
	Audio out & Mic in	**1 x Headset for external microphone + headphone**
	Kensington lock	**X 1**
	DC-in	**X 1**
Option Specification	**TPM/G-sensor**	***TPM (NPCT420DAO)** ***G-Sensor shock protection (Kionix KXCNL-1010)**
	3G	***USB interface** ***H350-A50-10 support** **GSM/GPRS/EDGE Band(MHz): 900/1800** **WCDMA Band(MHz): 900/2100** **HSDPA(Mbps): 21** **HSUPA(Mbps):5.76** ***H350-B50-10 support** **GSM/GPRS/EDGE Band(MHz): 850/1900** **WCDMA Band(MHz): 850/1900** **HSDPA(Mbps): 21** **HSUPA(Mbps):5.76**

3. System Overview

System Memory

The System consists of DDR3L memory on 64-bit bus and up to 8GB total.

The BIOS will automatically detect the amount of memory during POST.

VGA

SOC Integrated. When the POST, can only display one monitor.

Audio

The audio controller is integrated in south bridge and through the AZALIA data line to external CODEC to reduce the noise caused by PCB's layout. According to the H/W architecture, the BIOS will recognize it as a PCI device and initialize it in PCI bus initialization. The PCI legacy audio mode is not to be supported.

Card Reader

SD Card 3.0 interface.

LAN Controller

PCI-E interface, RealTek8111G, support 10/100/1000 Mb/sec.

4. Power Management

4.1 General Requirement

The purpose of the Power Management (PM) is trying to reduce the power consumption of the system and extent the battery life, increase the time without recharging the battery. The Advanced Configuration and Power Interface (ACPI) specification is the latest and better PM method and will replace the traditional APM and PNP functions. ACPI is a kind of Operating System Directed Power Management (OSPM), that is, the OS will control the system/devices to enter proper power-saving mode and determine when to do it.

The BIOS shall provide the ACPI table that is written by ASL language, to tell the OS how to setup and control the system/device configuration and the power-saving mode. So the system H/W, BIOS and drivers must be meet the ACPI specification:

- ✧ ACPI 5.0 compliant
- ✧ Supporting processor power state C0, C1, C1E, C3, C6, C7
- ✧ Supporting system state S0, S3, S4
- ✧ Support Power Management Function

First of all, the next section will depict the power management state transition, then describe the definition for each system state.

4.2 Power Management Mode Definitions

Each system (or model) may have different PM model and state definition. For clear, see the following table:

PM Mode	Definitions
Full-On	The CPU runs in full speed and all the devices are power on. The system can respond to all applications with maximum performance. 1. The system is in the state S0. 2. The CPU is in the state C0. 3. All the devices are in the state D0.
Idle	This mode is similar to Full-On. The CPU might change into C1 ~ C7 state depend on the OS, in order to save CPU power consumption. 1. The system is in the state S0. 2. The CPU is in the state C1 ~ C7. 3. All the devices are in the state D0.
Suspend	The state is more power saving than above, the CPU and most of parts power will be cut off except DRAM system. 1. The system is in the state S3. 2. The CPU is power off and all device stop clock except DRAM system. PS. Not support DOS S1 function.
SOFF/STD	The state is the most power saving mode, all of the parts in the system will power off, except the keyboard controller enter to idle mode continuously to control the battery charging and monitor power

	button. Note: Before enter to S4, the OS will save all of data or registers in HDD. 1. The system is in the state S5 or S4. 2. The CPU and all of devices are power off.
Silent	This modes has the lowest CPU speed and lowest fan noise.

When system is in suspend mode (S3 state), use Power button, LAN or internal keyboard to resume.

4.3 MANAGE POWER FUNCTION

The purpose of Power Management is to save the power consumption during the system is not busy. This function not only save the power of Battery to extend the Notebook's battery working time, but also reduce the temperature of CPU / Chip and keep system working in a lower temperature to extend the CPU and whole system's life. Also reduce temperature will also keep Operation System work stable.

The PowerManagement Function refer to 14 Power Management function control table.

When System is in Silent mode, then will keep Silent mode status when resume from S3 and S4.

When System is in Silent mode, resume from cold boot, warm boot, System will turn off Silent mode.

4.4 CPU Fan Control

In the system use the fan as the active cooling device. It is not necessary always turn on full speed, so following will depict the method and specification of fan speed control. Before it we would like to define the fan speed:

Because fan will consume some power and make some noise, the system will try to keep the fan in low speed and keep the system in high performance as possible. Unfortunately, there are some trade-off among some factors: thermal, noise and CPU performance, so we increase the fan speed as active cooling method and decrease the CPU clock speed as passive cooling method. The CPU clock and fan speed is controlled depend on the CPU temperature from Power Management function architecture.

4.5 The backlight control of LCD

The LCD panel is another key parts that will consume more power of the notebook system, so there is a way to reduce the power consumption on battery only, i.e. reduce the brightness of backlight when end-user unplug the AC adaptor.

The backlight is controlled through the SOC, and it is divided into several levels from darkest to brightest. The VGA driver knows the status of power source and the current backlight's brightness any time. When the AC adaptor unplug, the VGA driver will reduce the brightness one or two level automatically.

There is another approach to control the backlight, it will be turn off when LCD cover is close (LID switch), conversely, it will be turn on when LCD cover is open

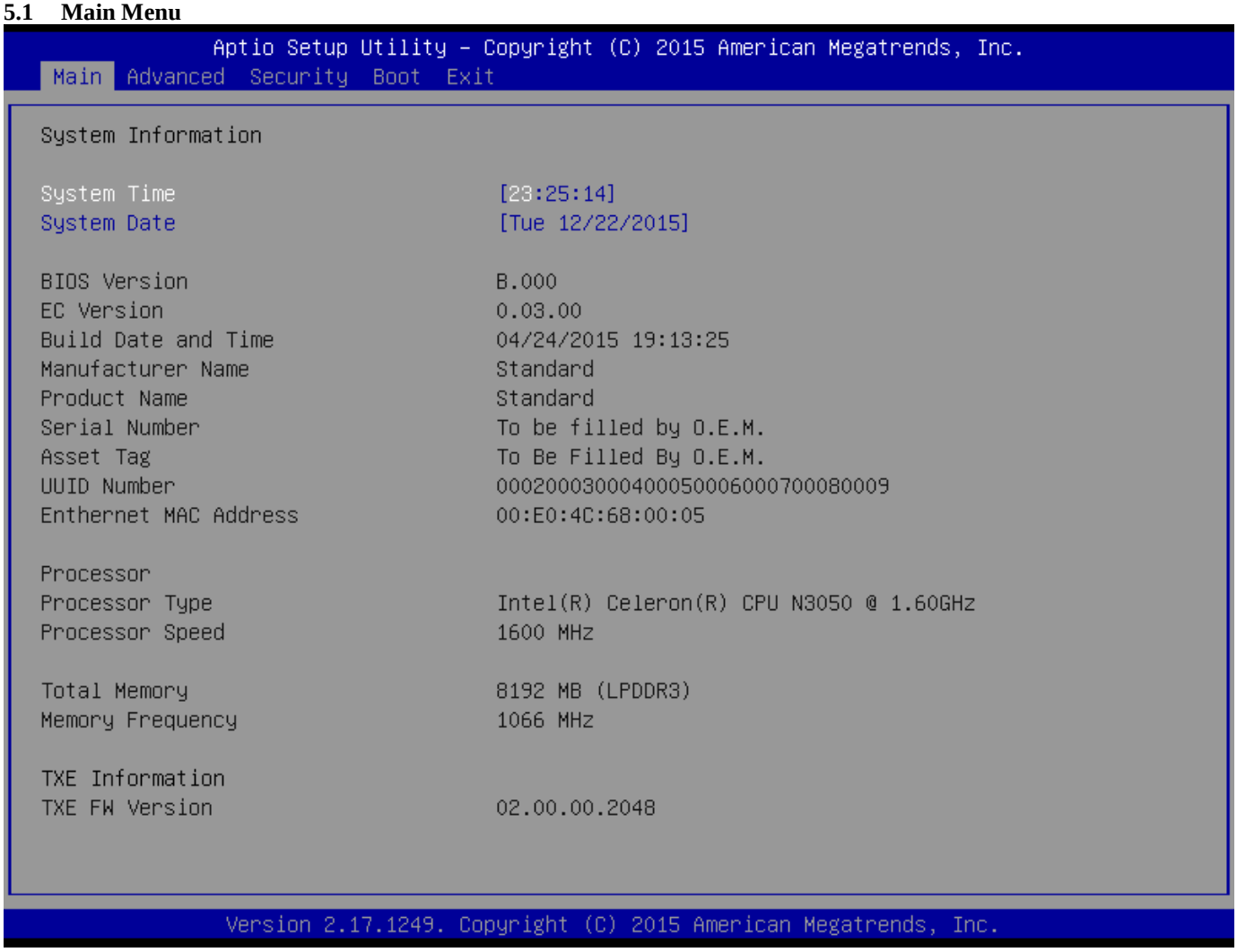
Support Windows Mobility Center Backlight control.

5. BIOS Setup Menu

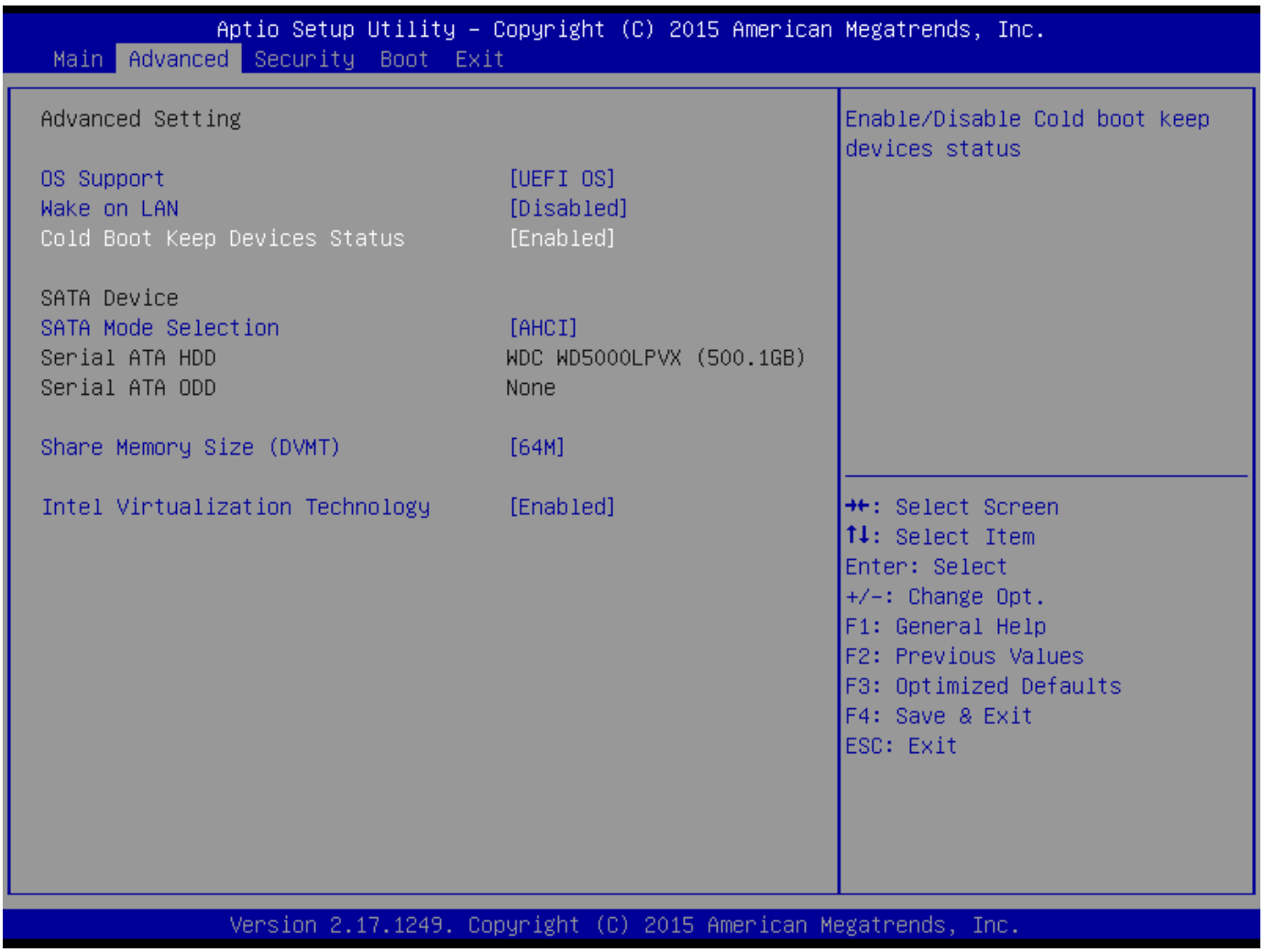
The setup function only can be invoked by pressing Del or F2 key during POST and it provide an approach to change some setting and configuration the user prefer, and the changed values will save in the NVRAM and will take effect after the system rebooted. The setup uses a menu interface to allow the user to configure their system and the features are briefly listed as follow.

Press F7 key for Boot Menu. Additionally, holding " [Ctrl] + [Home] " when pressing the power button would enter the crisis mode.

5.1 Main Menu



5.2 Advanced Menu (For Windows 8.x)



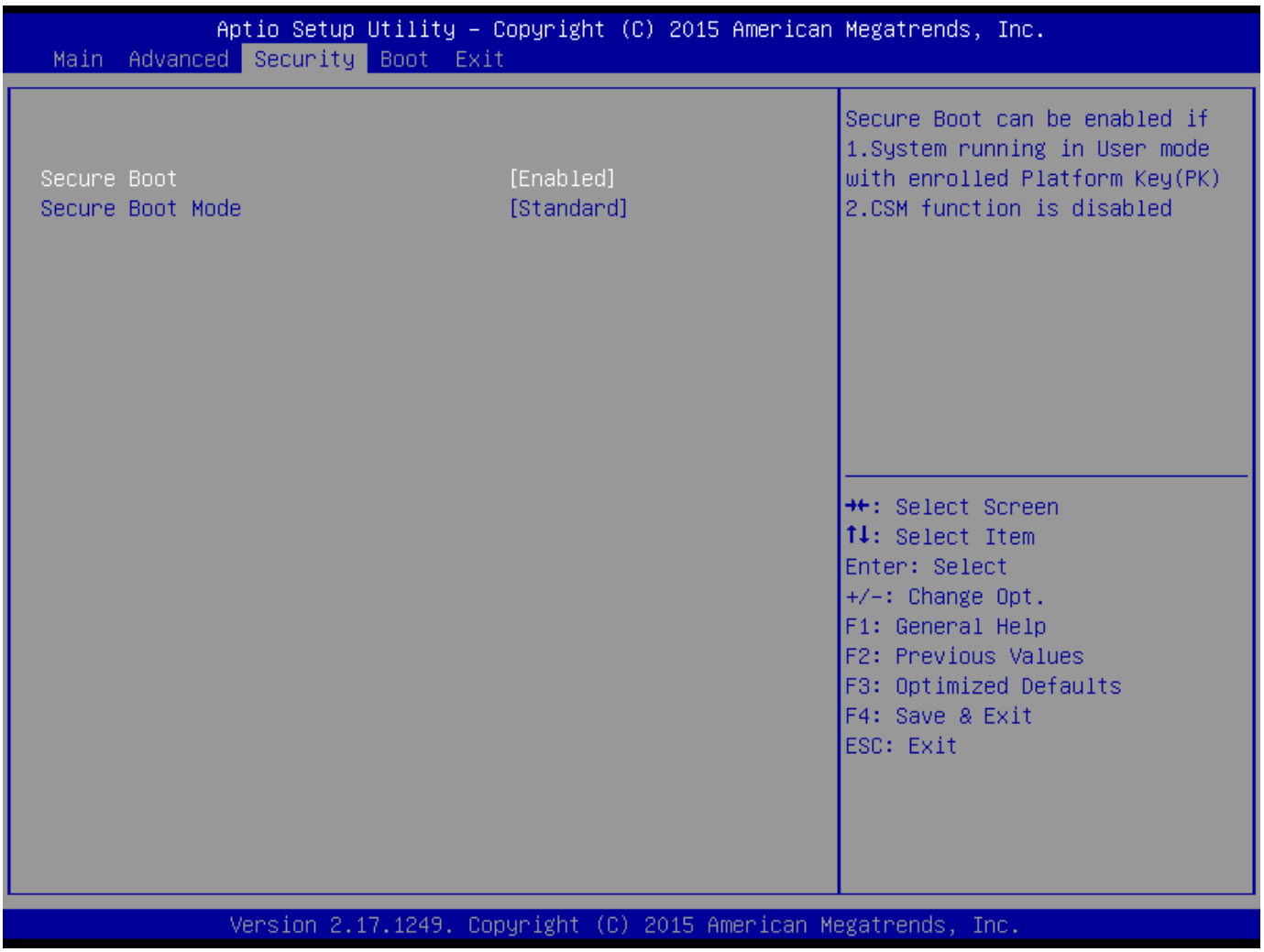
Shared Memory Size:

Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.

Intel Virtualization Technology:

When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

5.3 Security Menu

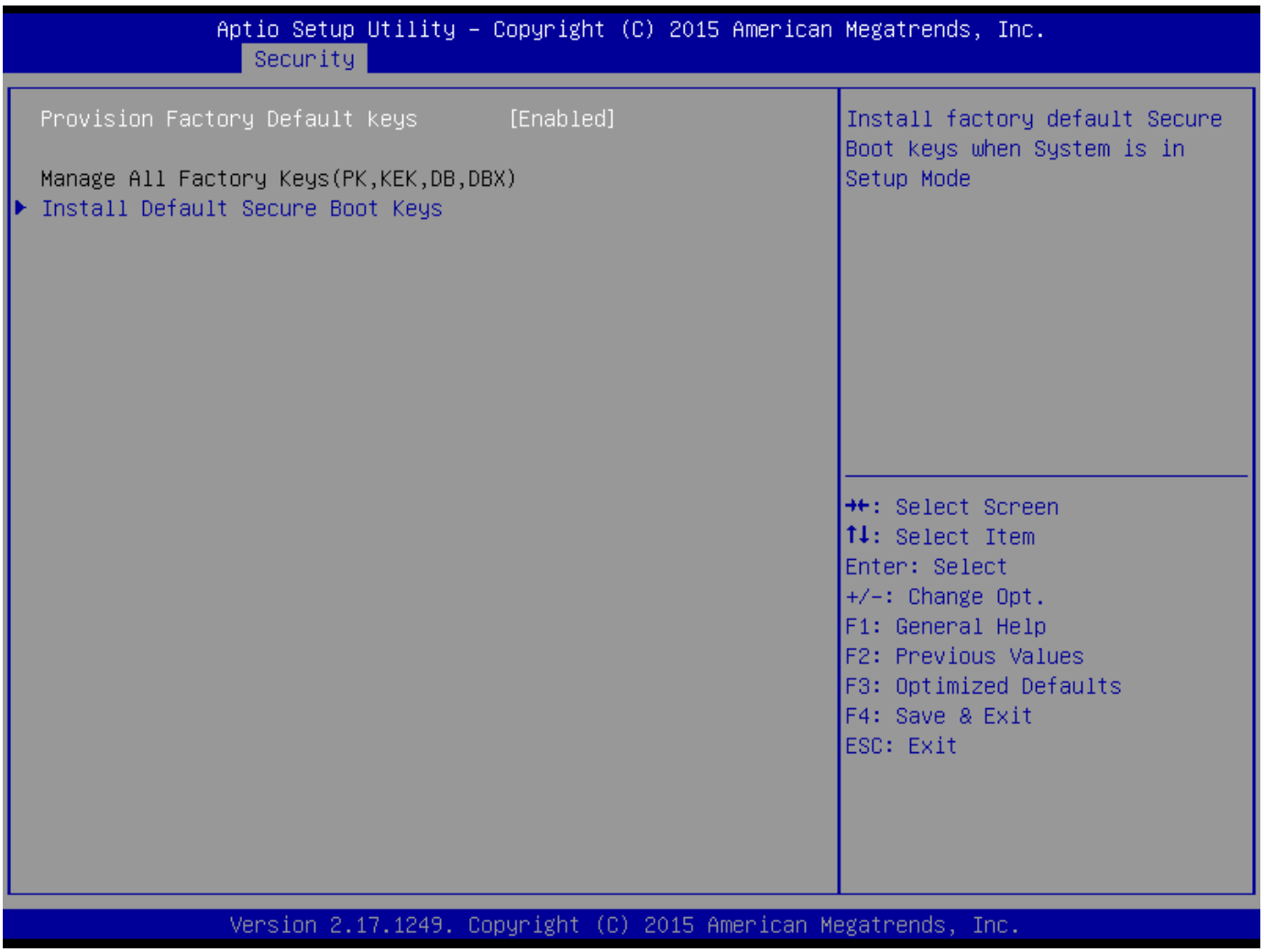


Secure Boot:

Secure Boot can be enabled if system running in User mode with enrolled Platform Key (PK)

Secure Boot Mode:

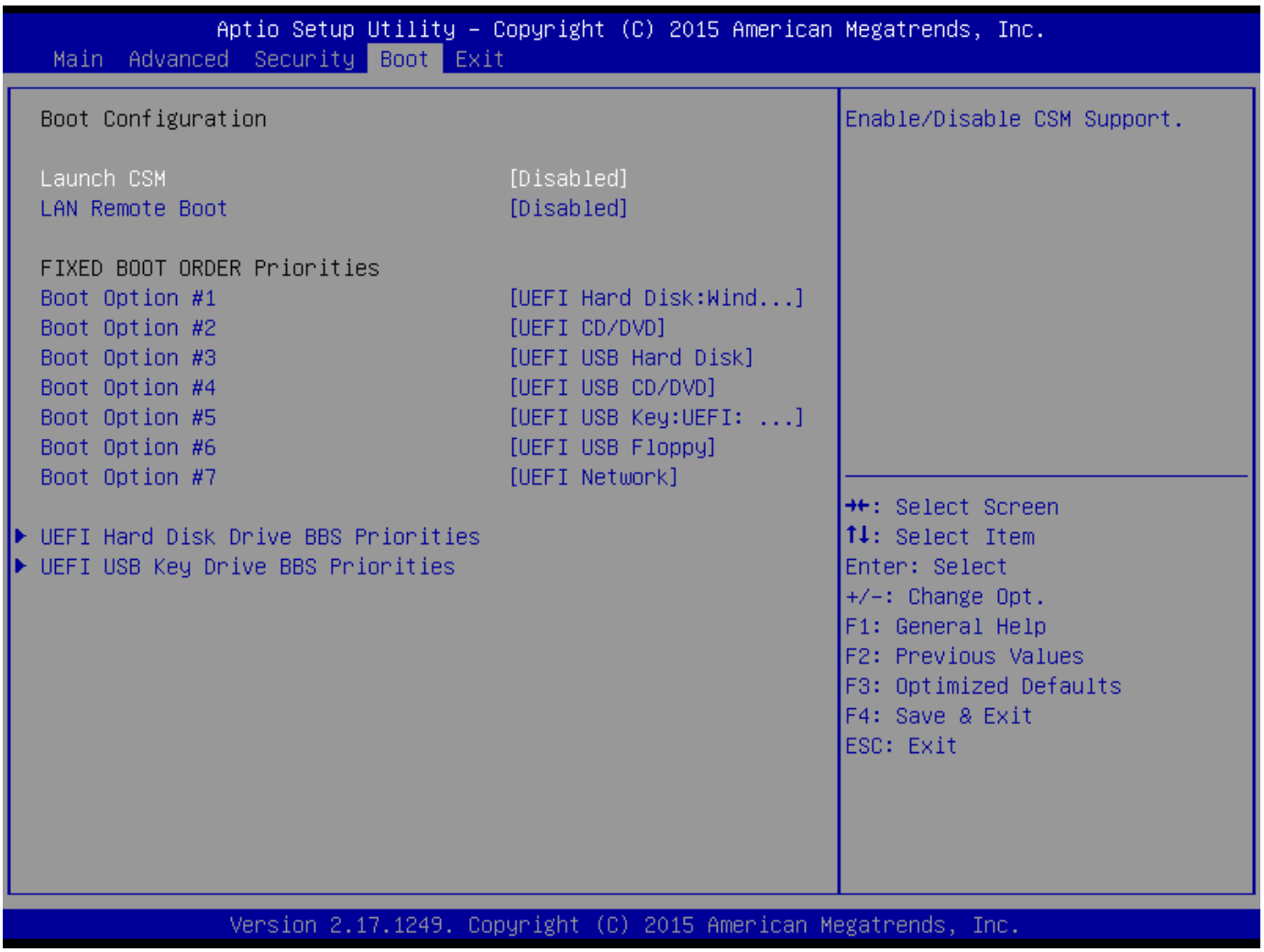
Secure Boot mode selector. 'Custom' Mode enables users to change Image Execution policy and manage Secure Boot Keys. This item will show when Secure Boot is 'Enabled'.



Key Management:

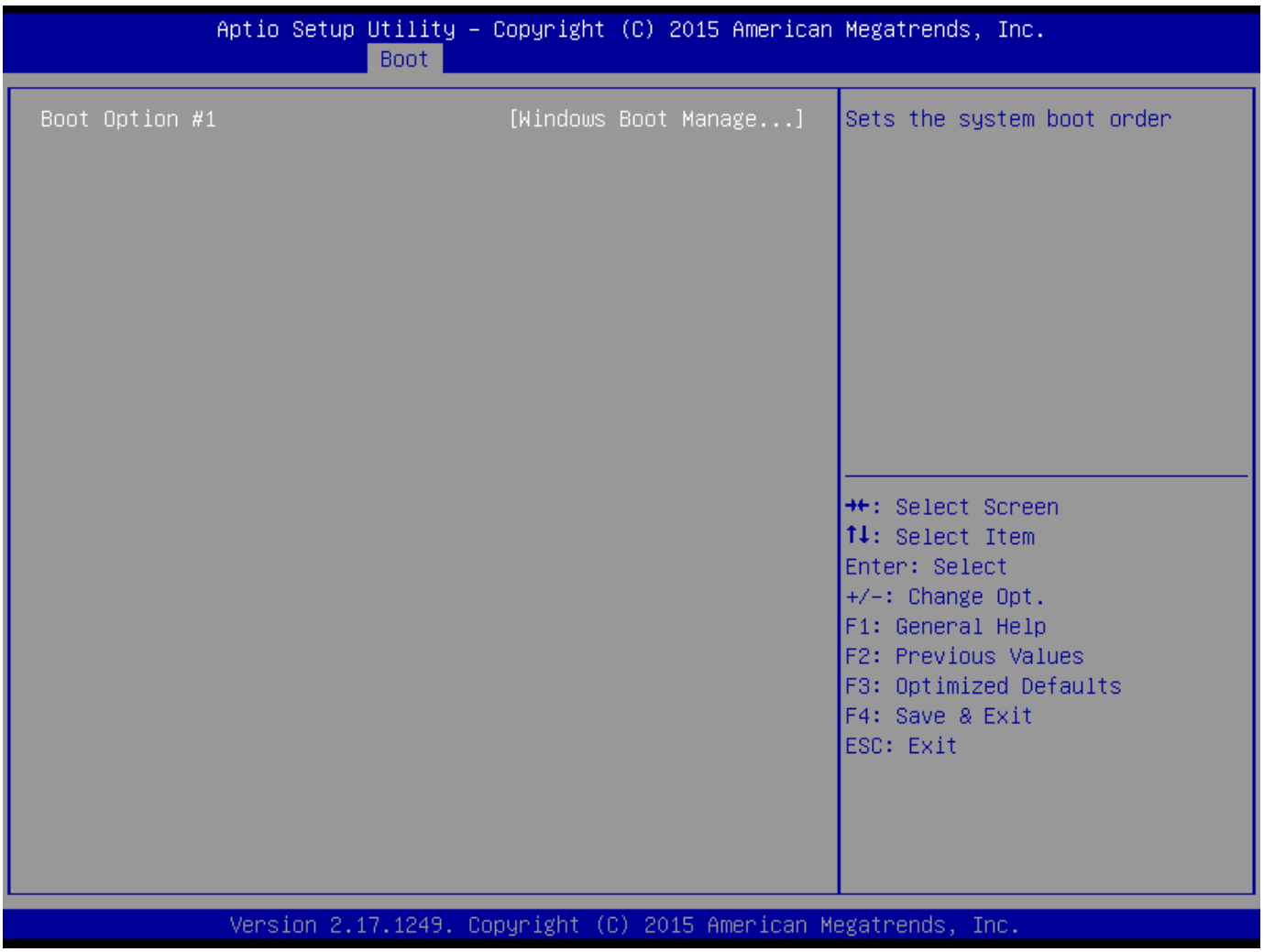
Enables experienced users to modify Secure Boot variables. This item will show when Secure Boot is 'Enabled' and Secure Boot Mode is ' Custom'

5.4 Boot Menu

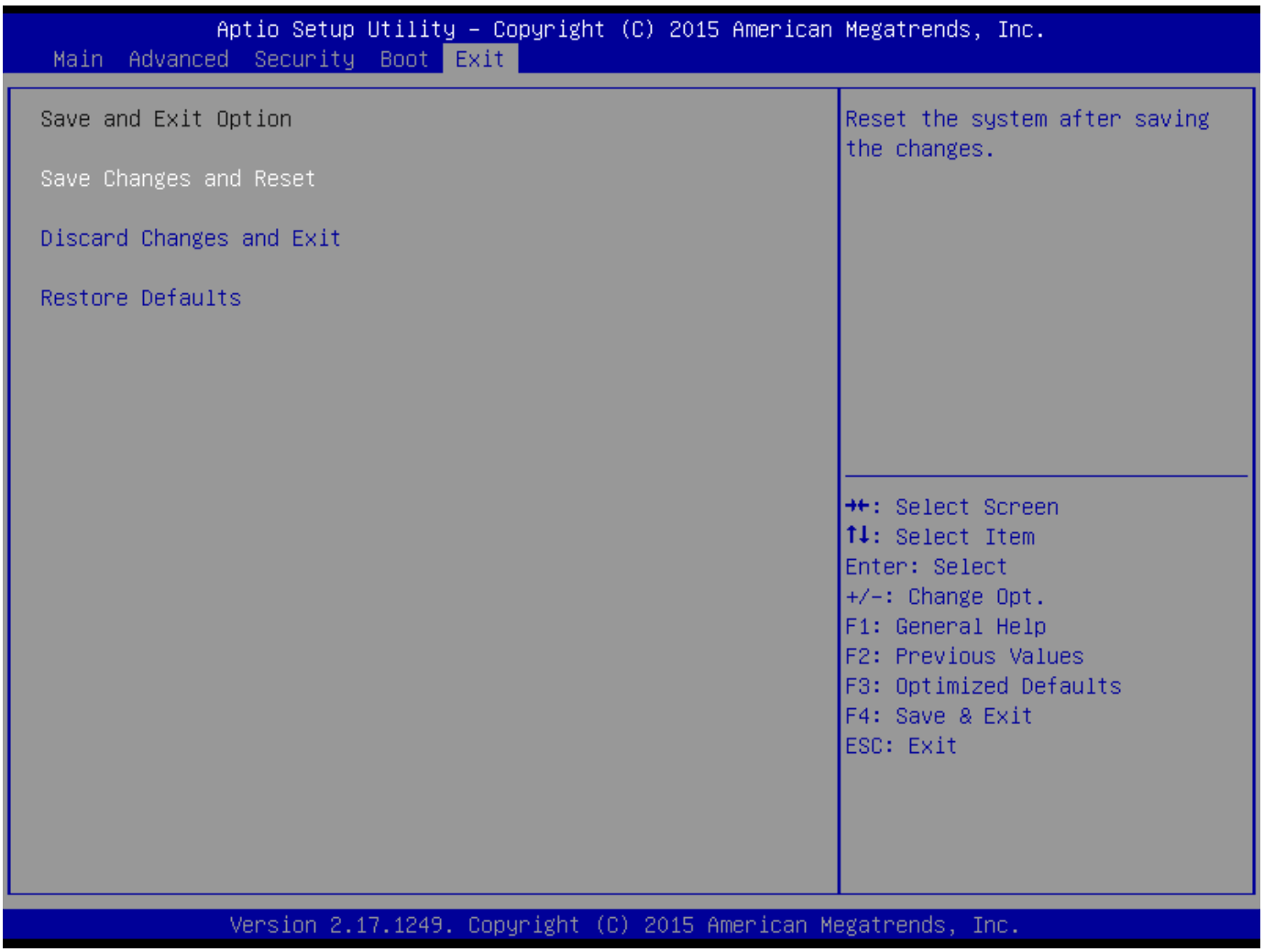


Boot Option Priorities:

Sets the system boot order, the boot order will load default after press F3. Additionally, the SD card boot is not allowed.



5.5 SAVE & EXIT Menu



Save Changes and Reset:

Reset the system after saving the changes.

Discard Changes and Exit:

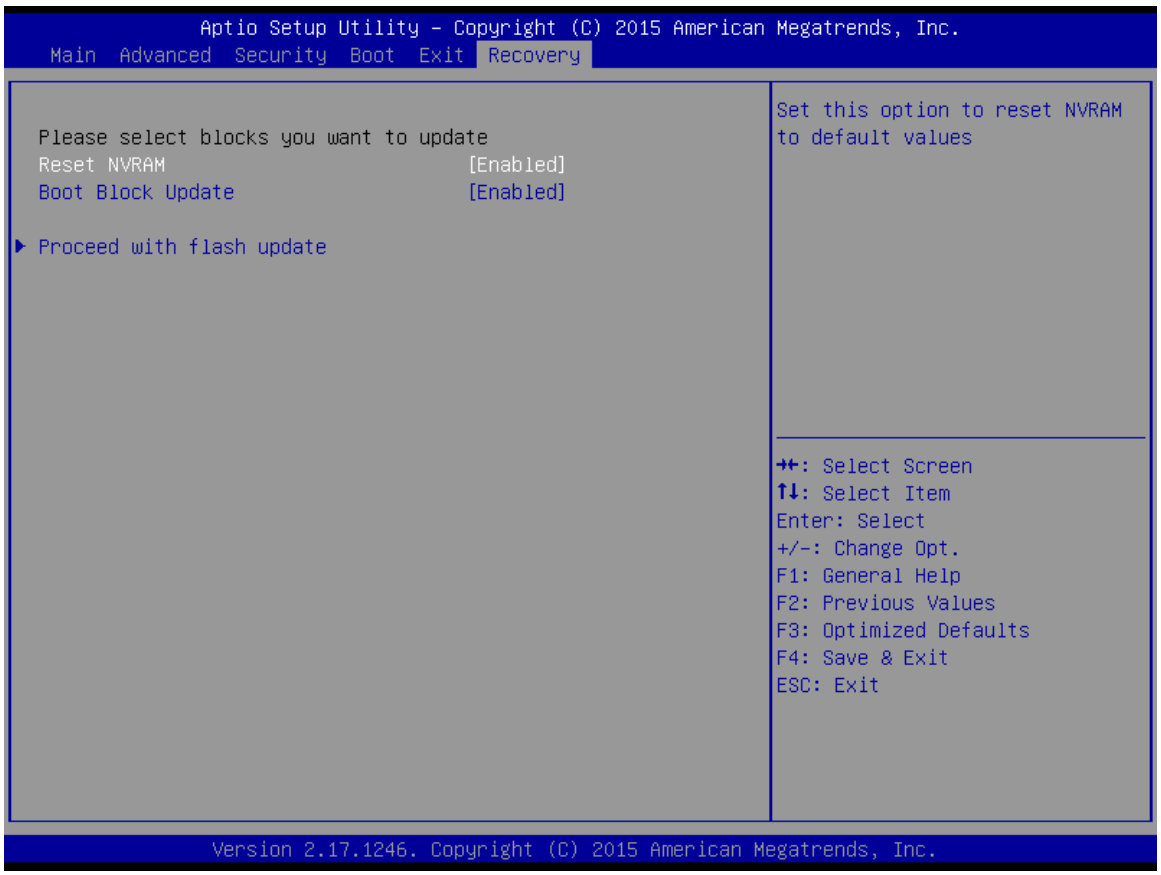
Exit system setup without saving any changes.

Restore Defaults:

Restore/Load Default values for all the setup options.

5.6 Recovery

Press “Ctrl+Home” can enter recovery mode if there is a crisis BIOS in your USB key and plug-in the system.


Aptio Setup Utility – Copyright (C) 2015 American Megatrends, Inc.
Main Advanced Security Boot Exit Recovery
Please select blocks you want to update
Reset NVRAM [Enabled]
Boot Block Update [Enabled]
Proceed with flash update
Set this option to reset NVRAM to default values
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.17.1246. Copyright (C) 2015 American Megatrends, Inc.

6. DSDT, SSID and SVID Table

	For Customer		STD	
ACPI DSDT String OEM ID	T.B.D (with 6 character)		ALASKA	
ACPI DSDT String OEM Table ID	T.B.D(with 8 character)		A M I	
DMI Type1 Manufacturer	T.B.D		T.B.D	
DMI Type1 Product Name	T.B.D		T.B.D	
	For Customer		STD	
Device	SSID	SVID	SSID	SVID
Intel PCI bridge	T.B.D	T.B.D	0x1012	0x1D05
Intel VGA	T.B.D	T.B.D	0x1012	0x1D05
Intel PCI Express	T.B.D	T.B.D	0x1012	0x1D05
Intel XHCI	T.B.D	T.B.D	0x1012	0x1D05
Intel LPC	T.B.D	T.B.D	0x1012	0x1D05
Intel SATA	T.B.D	T.B.D	0x1012	0x1D05
Intel SMBUS	T.B.D	T.B.D	0x1012	0x1D05
Realtek ALC269Q	T.B.D	T.B.D	0x1012	0x1D05
LAN realtek8111G	T.B.D	T.B.D	0x1012	0x1D05

7. PCIe Device

The following will list all PCIe devices:

PCIe Device				
PCIe port	Bus#	Device#	Func#	Device Name
PCIE1	2	0	0	LAN

8. SMBus Devices

The SMBus is a two-wire interface through which the system can communicate with power-related chips. The BIOS should initialize the SMBus devices during POST.

SMBus Device	Host/Slave	Address	Connect to
SO-DIMM0	slave	A0h	MCH
Battery	slave	A0h/A1h	EC (SMB0)
DDR Thermal sensor	slave	98h/99h	EC (SMB1)
RTD2136	slave	6Ah/6Bh	EC (SMB1)

9. GPIO Pin Assignment

Controller	Pad Name	Default Func.	Power	NDBW1401 use
NORTH	CX_PRDY_N	PRDY_N	V1P8A	N/A
	CX_PREQ_N	PREQ_N	V1P8A	N/A
	GP_CAMERASB00	GP_CAMERASB00	V1P8A	N/A
	GP_CAMERASB01	GP_CAMERASB01	V1P8A	N/A
	GP_CAMERASB02	GP_CAMERASB02	V1P8A	N/A
	GP_CAMERASB03	GP_CAMERASB03	V1P8A	N/A
	GP_CAMERASB04	GP_CAMERASB04	V1P8A	N/A
	GP_CAMERASB05	GP_CAMERASB05	V1P8A	N/A
	GP_CAMERASB06	GP_CAMERASB06	V1P8A	N/A
	GP_CAMERASB07	GP_CAMERASB07	V1P8A	N/A
	GP_CAMERASB08	GP_CAMERASB08	V1P8A	N/A
	GP_CAMERASB09	GP_CAMERASB09	V1P8A	N/A
	GP_CAMERASB10	RSVD Input	V1P8A	N/A
	GP_CAMERASB11	GP_CAMERASB11	V1P8A	N/A
	GPIO_DFX0	RSVD Inputs	V1P8A	N/A
	GPIO_DFX1	RSVD Inputs	V1P8A	N/A
	GPIO_DFX2	RSVD Inputs	V1P8A	N/A
	GPIO_DFX3	RSVD Inputs	V1P8A	N/A
	GPIO_DFX4	RSVD Inputs	V1P8A	N/A
	GPIO_DFX5	RSVD Inputs	V1P8A	N/A

	GPIO_DFX6	RSVD Inputs	V1P8A	N/A
	GPIO_DFX7	RSVD Inputs	V1P8A	N/A
	GPIO_DFX8	RSVD Inputs	V1P8A	N/A
	GPIO_SUS0	GPIO_SUS0	V1P8A	N/A
	GPIO_SUS1	GPIO_SUS0	V1P8A	N/A
	GPIO_SUS2	GPIO_SUS0	V1P8A	N/A
	GPIO_SUS3	GPIO_SUS0	V1P8A	N/A
	GPIO_SUS4	GPIO_SUS0	V1P8A	N/A
	GPIO_SUS5	GPIO_SUS0	V1P8A	N/A
	GPIO_SUS6	GPIO_SUS0	V1P8A	SMC_WAKE_SCI#_R
	GPIO_SUS7	GPIO_SUS0	V1P8A	SOC_EXTSMI#.
	HV_DDI0_DDC_SCL	HV_DDI0_DDC_SCL	V1P8A	N/A
	HV_DDI0_DDC_SDA	HV_DDI0_DDC_SCL	V1P8A	N/A
	HV_DDI0_HPD	HV_DDI0_HPD	V1P8A	N/A
	HV_DDI1_HPD	HV_DDI1_HPD	V1P8A	LVDS_HPD
	HV_DDI2_DDC_SCL	HV_DDI2_DDC_SCL	V1P8A	HDMI_EDID_CLK
	HV_DDI2_DDC_SDA	HV_DDI2_DDC_SDA	V1P8A	HDMI_EDID_DATA
	HV_DDI2_HPD	HV_DDI2_HPD	V1P8A	HDMI_HPD
	PANEL0_BKLTCTL	PANEL0_BKLTCTL	V1P8A	N/A
	PANEL0_BKLTEN	PANEL0_BKLTEN	V1P8A	N/A
	PANEL0_VDDEN	PANEL0_VDDEN	V1P8A	N/A
	PANEL1_BKLTCTL	PANEL1_BKLTCTL	V1P8A	DDI1_BKLCTRL
	PANEL1_BKLTEN	PANEL1_BKLTEN	V1P8A	DDI1_BKLTEN
	PANEL1_VDDEN	PANEL1_VDDEN	V1P8A	DDI1_VDDEN
	PROCHOT_N	PROCHOT_N	V1P8A	PROCHOT#
	SEC_GPIO_SUS10	SEC_GPIO_SUS10	V1P8A	N/A
	SEC_GPIO_SUS11	SEC_GPIO_SUS11	V1P8A	N/A
	SEC_GPIO_SUS8	SEC_GPIO_SUS8	V1P8A	N/A
	SEC_GPIO_SUS9	SEC_GPIO_SUS9	V1P8A	@SOC_G_INT1_R
	SVID0_ALERT_N	SVID0_ALERT_N	V1P8A	SVID_ALERT_N
	SVID0_CLK	SVID0_CLK	V1P8A	SVID_CLK
	SVID0_DATA	SVID0_DATA	V1P8A	SVID_DATA
	TCK	TCK	V1P8A	N/A
	TDI	TDI	V1P8A	N/A
	TDO	TDO	V1P8A	N/A
	TMS	TMS	V1P8A	N/A
	TRST_N	TRST_N	V1P8A	N/A
EAST	MF_ISH_GPIO_0	ISH_GPIO_0	V1P8A	N/A
	MF_ISH_GPIO_1	ISH_GPIO_1	V1P8A	N/A

	MF_ISH_GPIO_2	ISH_GPIO_2	V1P8A	N/A
	MF_ISH_GPIO_3	ISH_GPIO_3	V1P8A	N/A
	MF_ISH_GPIO_4	ISH_GPIO_4	V1P8A	N/A
	MF_ISH_GPIO_5	ISH_GPIO_5	V1P8A	N/A
	MF_ISH_GPIO_6	ISH_GPIO_6	V1P8A	N/A
	MF_ISH_GPIO_7	ISH_GPIO_7	V1P8A	N/A
	MF_ISH_GPIO_8	ISH_GPIO_8	V1P8A	N/A
	MF_ISH_GPIO_9	ISH_GPIO_9	V1P8A	N/A
	MF_ISH_I2C1_SDA	ISH_I2C1_SDA	V1P8A	N/A
	MF_ISH_I2C1_SCL	ISH_I2C1_SCL	V1P8A	N/A
	PMU_AC_PRESENT	PMU_AC_PRESENT	V1P8A	ACPRESENT
	PMU_BATLOW_N	PMU_BATLOW_N	V1P8A	PMC_BATLOW#
	PMU_PLTRST_N	PMU_PLTRST_N	V1P8A	PMC_PLT_RST#
	PMU_PWRBTN_N	PMU_PWRBTN_N	V1P8A	PMC_PWRBTN#
	PMU_SLP_LAN_N	PMU_SLP_LAN_N	V1P8A	N/A
	PMU_SLP_S0IX_N	PMU_SLP_S0IX_N	V1P8A	N/A
	PMU_SLP_S3_N	PMU_SLP_S3_N	V1P8A	PMC_SLP_S3#
	PMU_SLP_S4_N	PMU_SLP_S4_N	V1P8A	PMC_SLP_S4#
	PMU_SUSCLK	PMU_SUSCLK	V1P8A	N/A
	PMU_WAKE_N	PMU_WAKE_N	V1P8A	PMC_WAKE_PCIE_0#
	PMU_WAKE_LAN_N	PMU_WAKE_LAN_N	V1P8A	N/A
	SUS_STAT_N	SUS_STAT_N	V1P8A	N/A
SOUTH EAST	SDMMC1_CLK	SDMMC1_CLK	V1P8A	EMMC1_CLK
	SDMMC1_CMD	SDMMC1_CMD	V1P8A	EMMC1_CMD
	SDMMC1_D0	SDMMC1_D0	V1P8A	EMMC1_D0
	SDMMC1_D1	SDMMC1_D1	V1P8A	EMMC1_D1
	SDMMC1_D2	SDMMC1_D2	V1P8A	EMMC1_D2
	SDMMC1_D3_CD_N	SDMMC1_D3_CD_N	V1P8A	EMMC1_D3
	MMC1_D4_SD_WE	MMC1_D4_SD_WE	V1P8A	EMMC1_D4
	SDMMC1_D5	SDMMC1_D5	V1P8A	EMMC1_D5
	SDMMC1_D6	SDMMC1_D6	V1P8A	EMMC1_D6
	SDMMC1_D7	SDMMC1_D7	V1P8A	EMMC1_D7
	SDMMC1_RCLK	SDMMC1_RCLK	V1P8A	N/A
	GPIO_ALERT	GPIO_ALERT	V1P8A	N/A
	ILB_SERIRQ	ILB_SERIRQ	V1P8A	LPC_SERIRQ
	MF_LPC_CLKOUT0	LPC_CLKOUT0	V3P3A/V1P8A	LPC_CLK_00
	MF_LPC_CLKOUT1	LPC_CLKOUT1	V3P3A/V1P8A	N/A
	MF_LPC_AD0	LPC_AD0	V3P3A/V1P8A	LPC_AD0
	MF_LPC_AD1	LPC_AD1	V3P3A/V1P8A	LPC_AD1

	MF_LPC_AD2	LPC_AD2	V3P3A/V1P8A	LPC_AD2
	MF_LPC_AD3	LPC_AD3	V3P3A/V1P8A	LPC_AD3
	LPC_CLKRUN_N	LPC_CLKRUN_N	V3P3A/V1P8A	LPC_CLKRUN#
	LPC_FRAME_N	LPC_FRAME_N	V3P3A/V1P8A	LPC_FRAME#
	MF_PLT_CLK0	PLT_CLK0	V1P8A	N/A
	MF_PLT_CLK1	PLT_CLK1	V1P8A	N/A
	MF_PLT_CLK2	PLT_CLK2	V1P8A	N/A
	MF_PLT_CLK3	PLT_CLK3	V1P8A	N/A
	MF_PLT_CLK4	PLT_CLK4	V1P8A	N/A
	MF_PLT_CLK5	PLT_CLK5	V1P8A	N/A
	PMU_RSTBUTTON_N	PMU_RSTBUTTON_N	V1P8A	PMC_RSTBTN#
	SUSPWRDNACK	SUSPWRDNACK	V1P8A	SUSPWRDNACK
	PWM0	PWM0	V1P8A	N/A
	PWM1	PWM1	V1P8A	N/A
	SDMMC3_1P8_EN	SDMMC3_1P8_EN	V1P8A	SD3_1P8EN
	SDMMC3_CD_N	SDMMC3_CD_N	V1P8A	SD3_CD#
	SDMMC3_CLK	SDMMC3_CLK	V3P3A/V1P8A	SD3_CLK
	SDMMC3_CMD	SDMMC3_CMD	V3P3A/V1P8A	SD3_CMD
	SDMMC3_D0	SDMMC3_D0	V3P3A/V1P8A	SD3_D0
	SDMMC3_D1	SDMMC3_D1	V3P3A/V1P8A	SD3_D1
	SDMMC3_D2	SDMMC3_D2	V3P3A/V1P8A	SD3_D2
	SDMMC3_D3	SDMMC3_D3	V3P3A/V1P8A	SD3_D3
	SDMMC3_PWR_EN_N	SDMMC3_PWR_EN_N	V1P8A	D3_PWREN#
	SDMMC2_CLK	SDMMC2_CLK	V1P8A	N/A
	SDMMC2_CMD	SDMMC2_CMD	V1P8A	N/A
	SDMMC2_D0	SDMMC2_D0	V1P8A	N/A
	SDMMC2_D1	SDMMC2_D1	V1P8A	N/A
	SDMMC2_D2	SDMMC2_D2	V1P8A	N/A
	SDMMC2_D3_CD_N	SDMMC2_D3_CD_N	V1P8A	N/A
	SPI1_CLK	SPI1_CLK	V1P8A	N/A
	SPI1_CS0_N	SPI1_CS0_N	V1P8A	N/A
	SPI1_CS1_N	SPI1_CS1_N	V1P8A	N/A
	SPI1_MISO	SPI1_MISO	V1P8A	N/A
	SPI1_MOSI	SPI1_MOSI	V1P8A	N/A
	USB_OC0_B	USB_OC0_N	V1P8A	USB_OC_00#
	USB_OC1_B	USB_OC1_N	V1P8A	USB_OC_01#
SOUTH WEST	FST_SPI_CLK	FST_SPI_CLK	V1P8A	FST_SPI_CLK
	FST_SPI_CS0_N	FST_SPI_CS0_N	V1P8A	FST_SPI_CS#0
	FST_SPI_CS1_N	FST_SPI_CS1_N	V1P8A	N/A

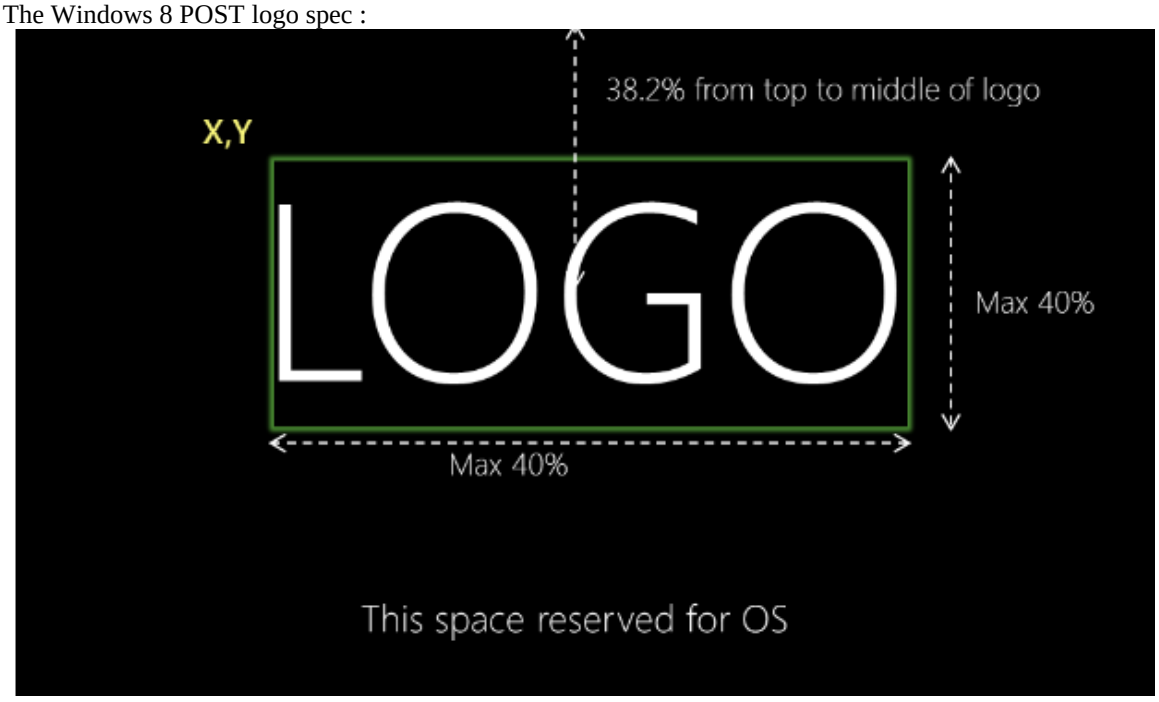
	FST_SPI_CS2_N	FST_SPI_CS2_N	V1P8A	N/A
	FST_SPI_D0	FST_SPI_D0	V1P8A	FST_SPI_D0
	FST_SPI_D1	FST_SPI_D1	V1P8A	FST_SPI_D1
	FST_SPI_D2	FST_SPI_D2	V1P8A	FST_SPI_D2
	FST_SPI_D3	FST_SPI_D3	V1P8A	FST_SPI_D3
	MF_HDA_CLK	GP_SSP_0_I2S_TXD	V1P8A/V1P5A	ACZ_BITCLK
	MF_HDA_DOCKEN_N	GP_SSP_1_I2S_RXD	V1P8A/V1P5A	N/A
	MF_HDA_DOCKRST_N	GP_SSP_1_I2S_TXD	V1P8A/V1P5A	N/A
	MF_HDA_RST_N	GP_SSP_0_I2S_CLK	V1P8A/V1P5A	ACZ_RST#
	MF_HDA_SDI0	GP_SSP_1_I2S_CLK	V1P8A/V1P5A	ACZ_SDATAIN0
	MF_HDA_SDI1	GP_SSP_1_I2S_FS	V1P8A/V1P5A	N/A
	MF_HDA_SDO	GP_SSP_0_I2S_RXD	V1P8A/V1P5A	ACZ_SDATAOUT
	MF_HDA_SYNC	GP_SSP_0_I2S_FS	V1P8A/V1P5A	ACZ_SYNC
	UART1_CTS_N	UART1_CTS_N	V1P8A	N/A
	UART1_RTS_N	UART1_RTS_N	V1P8A	N/A
	UART1_RXD	UART1_RXD	V1P8A	N/A
	UART1_TXD	UART1_TXD	V1P8A	N/A
	UART2_CTS_N	UART2_CTS_N	V1P8A	N/A
	UART2_RTS_N	UART2_RTS_N	V1P8A	N/A
	UART2_RXD	UART2_RXD	V1P8A	N/A
	UART2_TXD	UART2_TXD	V1P8A	N/A
	I2C0_SCL	I2C0_SCL	V1P8A	@SIO_I2C0_CLK
	I2C0_SDA	I2C0_SDA	V1P8A	@SIO_I2C0_DATA
	I2C1_SCL	I2C1_SCL	V1P8A	@TPM_SINT#
	I2C1_SDA	I2C1_SDA	V1P8A	@TPM_SRESET#
	I2C2_SCL	I2C2_SCL	V1P8A	@SIO_I2C2_CLK
	I2C2_SDA	I2C2_SDA	V1P8A	@SIO_I2C2_DATA
	I2C3_SCL	I2C3_SCL	V1P8A	N/A
	I2C3_SDA	I2C3_SDA	V1P8A	@G_INT2
	I2C4_SCL	I2C4_SCL	V1P8A	N/A
	I2C4_SDA	I2C4_SDA	V1P8A	N/A
	I2C5_SCL	I2C5_SCL	V1P8A	N/A
	I2C5_SDA	I2C5_SDA	V1P8A	N/A
	I2C6_SCL	I2C6_SCL	V1P8A	N/A
	I2C6_SDA	I2C6_SDA	V1P8A	N/A
	GP_SSP_2_CLK	GP_SSP_2_I2S_CLK	V1P8A	N/A
	GP_SSP_2_FS	GP_SSP_2_I2S_FS	V1P8A	N/A

	GP_SSP_2_RXD	GP_SSP_2_I2S_RXD	V1P8A	N/A
	GP_SSP_2_TXD	GP_SSP_2_I2S_TXD	V1P8A	GPIO_S0_SC_65
	PCIE_CLKREQ0_N	PCIE_CLKREQ0_N	V1P8A	MINI_CLKREQ0#
	PCIE_CLKREQ1_N	PCIE_CLKREQ1_N	V1P8A	GLAN_CLKREQ1#
	PCIE_CLKREQ2_N	PCIE_CLKREQ2_N	V1P8A	MINI_CLKREQ2#
	PCIE_CLKREQ3_N	PCIE_CLKREQ3_N	V1P8A	SD3_WP_BD5
	SATA_GP0	SATA_GP0	V1P8A	N/A
	SATA_GP1	SATA_GP1	V1P8A	N/A
	SATA_GP2	SATA_GP2	V1P8A	N/A
	SATA_GP3	SATA_GP3	V1P8A	N/A
	SATA_LEDN	SATA_LEDN	V1P8A	SATA_LED_N
	MF_SMB_ALERT_N	SMB_ALERT_N	V1P8A	MF_SMB_ALERTB
	MF_SMB_CLK	SMB_CLK	V1P8A	MF_SMB_CLK
	MF_SMB_DATA	SMB_DATA	V1P8A	MF_SMB_DATA

10. Boot Logo

The STD BIOS should be no logo (even the Platform logo) in the POST time. But the OEM BIOS can have the logo when POST time. It follow the Windows 8.x spec, the loge should be smaller than 30KB. The logo image's format can be jpg, bmp, png and gif.

The Windows 8 POST logo spec :



If the screen was 1366x768, and the logo that was going to be displayed 400 x 300, the location of the top left corner could be found as follows.

Find the center of the screen:

Width: (1366/2) = 683 Height : (768/2) = 384

Now the top left corner (X, Y) can be found by subtraction half of the height and width of the logo.

Width : (400/2) = 200 Height : (300/2) = 150

(683 - 200) = 483 (384-150) = 234

X, Y = (483, 234)

11. Windows 8.x Brightness control

Introduction

This paper define the ACPI BIOS support Brightness control on mobile systems running the Microsoft Windows 8.x operation system.

Brightness initialization

BIOS ACPI support brightness control Method (_BCL, _BCM, _BQC). Define the brightness from level 0 (dark) to level 100(bright). The AC/DC brightness level is power manager setting in win8.1. (Ref figure1)

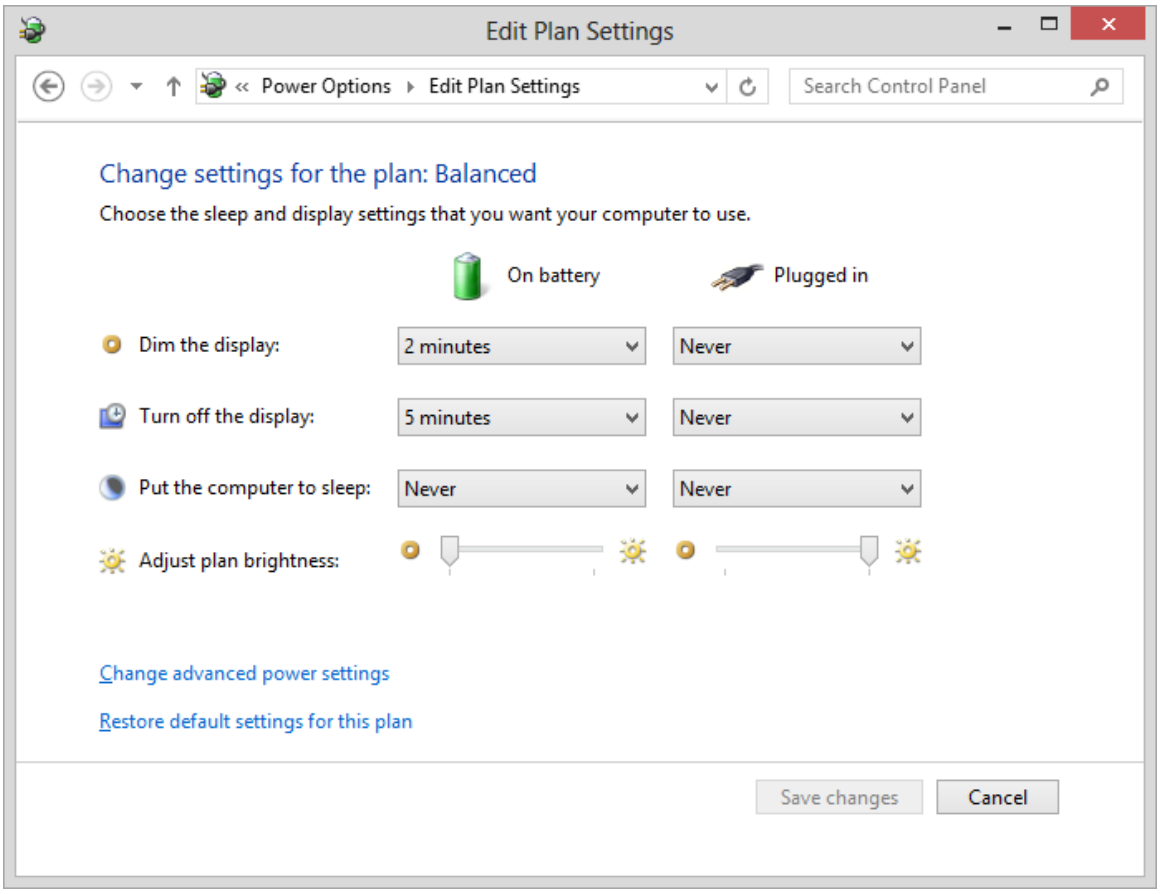


Figure 1

Brightness adjust

Windows8.1 provide the adjust display brightness function on the ControlPanel \ PowerOptions \ Adjust display brightness. User can adjust the AC and DC brightness level then save it.

Hot key Fn+F11/F12 adjust the brightness

Brightness hot-key notifications on Windows Control Panel \ Windows Mobility Center \

Display brightness.

User can use the hot-key Fn+F11/F12 to adjust the display brightness temporarily.

FN+F11 decrease brightness
FN+F12 increase brightness.

Power saving enable

The system brightness will down to level 0 after 10 minutes when user does not operate the keyboard and touchpad on battery mode power saving enable.

If user operates the keyboard or touchpad the brightness will back to the forward DC brightness level

If user plugs in the AC the system brightness will back to the AC brightness level

If user operates the USB-kb or USB-mouse to adjust the Mobility Center \ Display Brightness. The system brightness will keep at the last adjust level.

Hot key Fn+F3 Display switch

The function follow the "Windows key + P" spec.

12. Keyboard Controller

The system uses the ITE 8528 as the keyboard controller and ACPI embedded controller. Following will summarize all the features of keyboard firmware.

- Internal 88 Keys Keyboard and PS/2 Auxiliary Device Support.
- Internal Keyboard Scan Code Controller Support
- ACPI Embedded Controller Power Management Event Control.
- System Power On/Off ATX Power Sequence Control.
- FAN DAC or speed Control.
- Direct LEDs Support.
- "Ctrl + Home " , support BIOS recovery function.

13. Power management Control Table

CPU P-state P0, P1, P2,…Pn

Power saving mode define

1. Power saving mode only active on battery mode.
2. Power saving mode Enable mean ---- When Power On and user NOT press keyboard and NOT press Touchpad and NOT Plug in AC , over 10 minutes the brightnes will auto down to dark.
3. Power saving mode function can enable/disable by BIOS setup menu.

4. When On battery(Turn off the display : active then back) & Power Saving Resume, brightness level will by On battery(Turn off the display) setting.

	Status	After S3 resume	After S4 resume	After S5 resume	After restart
AC	OFF	OFF	OFF	OFF	OFF
	ON	ON	ON	OFF	ON
BAT	OFF	OFF	OFF	OFF	OFF
	ON	ON	ON	OFF	ON

14. EC S/W spec.

FAN Control Table

Fan running 10 Sec by 2.5V for System power on

Fan start voltage is 2.5V

Fan speed up when CPU temperature greater than (>) define temperature point for table

Fan speed down when CPU temperature smaller than (<) define temperature point for table

Normal mode(Tj = 100degC)

Local temp.		CPU temp				Fan speed & shutdown control
Up	Down	Up	Down			
			44			Fan off
		60	65			Fan 2.5v
		64	69			Fan 3.0v
		68	73			Fan 3.5v
		72	77			Fan 4.0v
		76	81			Fan 4.5v
		80	85			Fan 5.0v
		96				Speed Step
		98				SCI shutdown
		100				Power shutdown

Power saving mode(Tj = 100degC)

Local temp.		CPU temp				Fan speed & shutdown control
Up	Down	Up	Down			
			44			Fan off
		60	65			Fan 2.5v
						Fan 3.0v
						Fan 3.5v
						Fan 4.0v
						Fan 4.5v
		80	85			Fan 5.0v

		96				Speed Step
		98				SCI shutdown
		100				Power shutdown

Normal mode(Tj = 90degC)

Local temp.		CPU temp				Fan speed & shutdown control
Up	Down	Up	Down			
			50			Fan off
		53	57			Fan 2.5v
		56	61			Fan 3.0v
		60	65			Fan 3.5v
		64	69			Fan 4.0v
		68	73			Fan 4.5v
		72	78			Fan 5.0v
		86				Speed Step
		89				SCI shutdown
		90				Power shutdown

Power saving mode(Tj = 90degC)

Local temp.		CPU temp				Fan speed & shutdown control
Up	Down	Up	Down			
			50			Fan off
		53	57			Fan 2.5v
						Fan 3.0v
						Fan 3.5v
						Fan 4.0v
						Fan 4.5v
		72	78			Fan 5.0v
		86				Speed Step
		89				SCI shutdown
		90				Power shutdown

Normal mode(Tj = 80degC)

Local temp.		CPU temp				Fan speed & shutdown control
Up	Down	Up	Down			
			50			Fan off
		53	57			Fan 2.5v
		56	61			Fan 3.0v
		60	65			Fan 3.5v
		64	69			Fan 4.0v
		68	73			Fan 4.5v
		72	74			Fan 5.0v

		76				Speed Step
		79				SCI shutdown
		80				Power shutdown

Power saving mode(Tj = 80degC)

Local temp.		CPU temp				Fan speed & shutdown control
Up	Down	Up	Down			
			50			Fan off
		53	57			Fan 2.5v
						Fan 3.0v
						Fan 3.5v
						Fan 4.0v
						Fan 4.5v
		72	74			Fan 5.0v
		76				Speed Step
		79				SCI shutdown
		80				Power shutdown

Charging / Discharging Parameter

Battery Fully Charged Condition	
Smart Battery - Register 0x16 Battery Status FULLY_CHARGED (Bit::05) High	Stop Charging
Battery Charging Protection	
Smart Battery – Register 0x3C~0x3F Vcell1~Vcell4 Vmax. – Vmin. >= 1V(4S→0x3D~0x3F/3S→0x3C~0x3F)	Stop charging(To check cell status when adapter in)
Smart Battery - Register 0x16 Battery Status TERMINATE_CHARGE_ALARM (Bit::14) High	Trickle Charging(Charging 10 seconds/stop charging 30 seconds 10 cycles) ➔ for smart battery only (Reset when Adapter or Battery re-plugged.)
Smart Battery - Register 0x08 Battery Temperature (Li-Ion >= 45 ’C) Over Temperature Alarm	Pause Charging Continuous Charge when Li-Ion < 43 ’C
Smart Battery - Register 0x08 Battery Temperature (Li-Ion < 10 ’C) Under Temperature Alarm	Pre-Charge Normal Charge when Li-Ion >= 12 ’C

Smart Battery - Register 0x08 Battery Temperature (Li-Ion < 0 ’C) Under Temperature Alarm Dumb Battery <= 0’C	Pause Charging Pre-Charge when Li-Ion >= 2’C
Smart Battery - Register 0x0A Battery Current > Register 0x18 DesignCapacity Over Charging Current Alarm	Stop Charging (Reset when Adapter or Battery re-plugged.)
Smart Battery - Register 0x09 Battery Voltage 4S >= 17.2V ; 3S >= 12.9V ; 2S >= 8.6V Over Charging Voltage Alarm	Stop Charging (Reset when Adapter or Battery re-plugged.)
Smart Battery - Register 0x09 Battery Voltage 4S <= 9.6V ; 3S <= 7.2V ; 2S <= 4.8V Battery Wake-Up Charged over timer (> 6 minutes)	Wake-Up Charged (Reset when Adapter or Battery re-plugged.) Stop Charging
Smart Battery - Register 0x09 Battery Voltage 9.6V<4S<12V ; 7.2V<3S<9V ; 4.8V<2S<6V Battery Pre-Charged over timer (> 30 minutes)	Pre-Charged (Reset when Adapter or Battery re-plugged.) Stop Charging
Battery Power on charging over timer > 10 hrs for normal current ; > (Design capacity/current*1.3)+2) hrs for small current (EC Timer)	Stop Charging (Reset when Adapter or Battery re-plugged.)
Battery Power off charging over timer (> 8 hr) (EC Timer)	Stop Charging (Reset when Adapter or Battery re-plugged.)
Battery Discharging Protection	
Smart Battery - Register 0x0A Battery Current > Register 0x1A	Do throttling/DownClock mode/smart power protection until Battery Current <= Register 0x1A*0.7
Smart Battery - Register 0x08 Battery Temperature (Li-Ion >= 57 ’C)	Do throttling/DownClock mode/smart power protection to lowest level (Recovery when temp. <= 55’C)

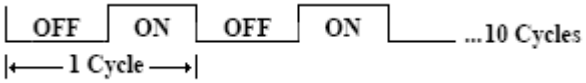
Smart Battery - Register 0x08 Battery Temperature (Li-Ion >= 60 ’C)	System automatic try into Suspend mode by Sleep Button event. (Can’t be resumed by user when temp. always >=58’C , if system wake-up by any method, system must automatically try to suspend mode again when temp. always >=58.C)
Smart Battery - Register 0x08 Battery Temperature (Li-Ion >=62 ’C)	System protected shutdown. (Can’t be powered on by user when temp. always >=58’C)
Smart Battery - Register 0x08 Battery Temperature (Li-Ion < -20 ’C) Dumb Battery <= 2’C	System automatic try into Suspend mode by Sleep Button event.(Can’t be resumed by user when temp. always < -18’C) Dumb battery can’t be resumed when temp. always <=4’C
Smart Battery - Register 0x08 Battery Temperature (Li-Ion < -22 ’C) Dumb Battery <= 0’C	System protected shutdown. (Can’t be powered on by user when temp. always < -18’C) Dumb battery can’t be powered on when temp. <= 2’C
System into suspend mode	System reject wake up if battery capacity <= 6%
Low Battery Capacity (Battery capacity <= 6%)	System cann’t be powered on.
System into shutdown mode (Battery capacity =0%)	System protected shutdown. (0% SCI shutdown)
Smart Battery - Register 0x09 Battery Voltage 4S < 12V ; 3S < 9V ; 2S < 6V Over Discharging Voltage Alarm	System protected shutdown. (EC shutdown)

Charging Current & Charging Voltage

Condition	Charging Current	Charging Voltage
Normal Charge	<= 0.65C	2S → 8.4V / 3S → 12.6V / 4S → 16.8V
Wake-up Charge	<= 0.1C	2S → 8.4V / 3S&4S → 12.6V
Pre-Charge	<= 0.1C	2S → 8.4V / 3S → 12.6V / 4S → 16.8V
Trickle Charge	<= 0.1C	2S → 8.4V / 3S → 12.6V / 4S → 16.8V

* Charge on pin Trickle charge status figure:

Charge current according charge current at the time.



Power saving Mode

Action: Speed Step / PROCHOT /BUS Speed			
	Speed step	PROCHOT	Bus Speed
Power saving Enable	N/A	Active	N/A
Power saving Disable	N/A	Inactive	N/A

Battery mode is Power saving mode for S3/S4 resume, Warmboot, Coldboot

Power saving active is over 40 Sec for S3/S4 resume, Warmboot, Coldboot by battery mode

Second Power saving active after 5Sec by first Power saving active

If Power saving Mode action is Bus Speed ,please see the Power saving table

Power saving Table	
Level	Bus Speed
Level 0(Normal)	N/A
Level 1	N/A

LED Indicator

Power On: Blue LED on

Suspend: Blue LED Blinking

Battery Charging: Red LED on

Battery Low: Red LED Blinking

Battery Fully Charged: N/A

Function Key define

Fn + Esc: NA

Fn + F1: Suspend

Fn + F2: Power saving Enable/Disable
Fn + F3: Switch display
Fn + F4: WLAN On/Off
Fn + F5: OSD
Fn + F6: Touch Pad Enable/Disable
Fn + F7: Webcam On/Off
Fn + F8: Mute
Fn + F9: Volume down
Fn + F10: Volume up
Fn + F11: Brightness down
Fn + F12: Brightness up

APC Table(40W Adapter)

Now APC Lvel	System Watt	APC Active Table
Level 0	> 38 W	Go to Level 1 (Stop charge and DownClock mode)
Level 1	> 38 W	Go to Level 2 (Disable PWR_USB port)
Level 2	> 43 W	Go to Level 3 (System shutdown)
Level 2	< 32 W	Enable PWR_USB port then Back to Level 1
Level 1	< 32 W	Release Power saving mode and normal charge then Back to Level 0
Level 0	< 32 W	Do nothing

PS: The APC protecting time is 60Sec.

Power On lock Power Button 15Sec

Set Power On lock time 15Sec not to allow Soft Off, Force Off and Power Switch Override

BIOS set lock time 40Sec only when power on first time after flashed.

Device status

Device	WLAN	WebCam	BT	3G	T/P
Default Status	OFF	OFF	OFF	OFF	Enable
Cold Boot	Keep Status				
Warm Boot	Keep Status				
S3 Resume	Keep Status				
S4 Resume	Keep Status				

Power Button

Power button de-bounce 0.1 Sec and second power button after 3Sec by first power button

When system is battery only, press power button 1.5 second to power-on.

Power USB

Press power button 5Sec to power USB mode for S4/S5 status

The power LED flash when press power button 1.5Sec for S4/S5 status in battery mode (mean now you can power on)